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Camellia Culture

FOR THE HOME GARDENER



H. M. BUTTERFIELD

CALIFORNIA AGRICULTURAL
Experiment Station
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MANUAL 5



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H. M. BUTTERFIELD

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This manual replaces the former Extension Circular 164

Camellia

The petals of *Camellia reticulata* (Captain Rawes type) are rose pink, wavy edged, with diameter of 5 to 7 inches.



H. M. BUTTERFIELD

BEGIN WITH MATURED PLANTS IF POSSIBLE

Most camellia growers begin with well-developed plants. Older plants tend to resist unfavorable garden conditions better than young plants, and to produce more flowers. Cost, however, may be a limiting factor.

If a gardener has the time, camellias can be grown from cuttings, grafts, or seeds. These slow processes are not always dependable, but if successful they are less costly than purchasing older plants. Each method of propagation is described under the section on propagation, appearing on pages 8 to 12.

What is a healthy plant? Avoid buying a plant that is stunted, or that has roots badly matted in the pot or container. That kind of plant will seldom be healthy. A balled plant normally is more promising than one already transferred to a container. A healthy camellia plant definitely indicates it by: 1) shiny, leathery, dark-green leaves; 2) absence of dead wood; and 3) compact form true to its variety.

When buying the plant, ask the nurseryman to tip it out of the container so that the roots can be examined. If they are badly matted, do not buy it.

CAMELLIAS HAVE SPECIFIC REQUIREMENTS

Climate

While camellias are grown satisfactorily in nearly all parts of California, the best blooms are produced where the summers are warm and the winters chilly. For instance, growers in the interior valleys seem to produce the highest percentage of prize blooms. This would indicate that climatic conditions are more favorable than along the cooler coastal regions.

Heat. In the valley regions, it is usually necessary to provide camellias with some kind of overhead shelter against extreme summer sun, especially during the middle of the day. When fur-

nishing overhead protection, remember that camellias do need considerable heat during the summer season; therefore, construct the overhead to protect yet not to deny the plant the heat it actually needs. Latticework seems to provide the best type of shelter.

Overhead protection is less important in the cooler coastal regions than in the warm inland valleys. Near the coast, north or east exposure usually provides sufficient shade.

Wind. The plant site chosen should provide shelter against prevailing winds, or a permanent windbreak should be

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built. Wind can injure tender new leaves, and cause rapid deterioration of blooms. Wind may also be partly responsible for the corky cell growth on the underside of the leaves. Any kind of injurious gas or chemical released in the air about the plant will produce the same effect as wind.

Wet weather. Heavy dew or rain may discolor the open blossoms. About the only protection against wet weather is some kind of temporary roof. A tarpaulin can be laid upon the overhead latticework; and cellophane can be used to cover specimen blooms. Potted or tubbed plants can be placed in a sheltered porch. Dew and rain are not a serious problem with camellias.

Soil

Camellias grow well in a variety of soils, ranging from slightly acid to slightly alkaline. An acid soil is not essential for good growth. A fertile organic loam soil is best.

Soil reaction. This is measured in terms of pH value, which refers to the acid-ion concentration. Neutral soil (neither acid nor alkaline) tests pH 7. In California, soils often test pH 7.5 or higher, which is decidedly alkaline; and some tap water tests pH 8 or higher.

Soil reaction between pH 5.5 and pH 6 is thought by some growers as about right for good results with camellias.

Use of acidifiers. It takes only a small amount of acidifier to change the reaction of any soil. From $\frac{1}{4}$ to $\frac{1}{2}$ pound of aluminum sulfate, for instance, is sufficient in many instances to acidify one square yard of soil about a plant.

With soils varying so greatly in pH value, and with other growth factors usually far more important, it is impossible to specify the exact interval between applications of acidifiers. One grower applied aluminum sulfate about once in every 4 to 6 weeks but that is more often than is necessary in most instances. Acidifiers may not be necessary if acid fertilizers are used regularly and if the

soil is almost neutral to start with. The use of acid peat moss or acid leaf mold will usually be adequate to insure proper soil acidity around camellia plants. Acid-type fertilizers further aid in maintaining soil reaction between pH 5.5 and pH 6.

Soil testing. Outfits for soil testing may be used to determine the acidity of the soil when plants show adverse symptoms. For instance, camellia leaves that begin to yellow may indicate too alkaline a soil, especially if the plants are exposed to hot sunlight. This condition would call for a soil acidifier.

Water. Kind of water used also may have some bearing on soil reaction. Water high in lime may need acid added before it is applied to camellias. Here again, only a small amount of acidifier is needed. For example, tap water testing pH 9.2 required only one drop of sulfuric acid to 15 gallons of water to bring the reaction down to pH 6.

Planting

Techniques. Camellias should be transplanted shortly before their new growth pushes out in late winter or early spring. This advice applies to pot, tub, or open-garden transplanting. Digging plants that are in active growth is not desirable. Transplanting much later than the time new growth starts may seriously retard the plant.

Dig a hole large enough and deep enough for the roots to be spread out in natural position. Several inches of good drainage materials should be spread at the bottom of the hole to prevent the collection of water around the plant roots. Drainage material can be gravel, small rocks, coarse sand, or pieces of broken flower pot. Set the plant so that, after the soil has settled, it will stand at about the same depth that it stood in the original container before transplanting. Avoid planting too deep—a practice that may invite brachyrhinus grubs (see page 13, in the section on control of pests, diseases, bud drop, and flower decline).

The can containing the camellia plant is cut down on opposite sides for easy removal of the plant.



Set the earthen form into a hole that is deep enough for the soil to be filled in to the original level.



Level the soil around the planted form and place a stake snugly against the plant for later support. Dig a shallow basin around the plant for irrigation.



Planting media. Many kinds of potting mixtures have proved successful. The John Innes Potting Mixture, 7 parts fertile loam soil, 3 parts acid peat moss, and 2 parts coarse sand, should be excellent for all potted or tubbed plants.

Plant containers. Camellias, if properly watered and fertilized, may be grown

in pots and tubs for several years. If it is necessary to hold larger plants in tubs, repot them often enough to avoid crowded or matted roots.

Young plants grow very well in greenhouse or frame, with a minimum night temperature of 65° F and a day temperature of 75°.

CULTURAL PRACTICES ARE IMPORTANT

Irrigating

Camellia plants need water from start of the dry season in April to start of the rainy season, sometimes as late as November. The plants may make two or even three flushes of growth during this season. The greater the leaf surface exposed to dry air, the more water the plant will use.



The symmetrical shape of this strong young plant of Kumasaka is the result of careful pruning. This variety is very popular.

Amount of water. A good rule of thumb in irrigation is to see that the water penetrates to the full depth of the root system. This may be difficult because soil conditions differ and sizes of plants differ. One method of determining the amount of water needed is to set a cup or pan on the ground to catch some of the water from a sprinkler. Measure the time it takes to catch 1 inch of water. This amount represents the time it takes to deliver 1 inch of water to the entire soil surface covered by the sprinkler.

One inch of water applied to the surface of sandy soil should wet down about 12 inches. The same inch of water applied to an intermediate loam will wet down only 6 to 10 inches, and applied to a fine-grained clay soil, down to only 4 or 5 inches.

Thus, if the camellia plant is in sandy soil, and the roots extend downward 24 inches, 2 inches of surface water are needed to penetrate down and cover the entire root system. The same plant, in intermediate loam soil, would require about 4 inches of water on the surface; in clay soil, about 5 inches.

Type of irrigation. Water may be applied in shallow basins around each plant or the sprinkler may be left on to soak down to the desired depth. A hose is used to water plants in containers.

Frequency of irrigation. This also is determined by soil texture. Heavy clay soil absorbs more water than sandy soil, and the greater the water-holding capacity of the soil, the less frequently it needs to be irrigated.

Thus, a camellia plant in sandy soil which does not hold water might need irrigating every 4 to 10 days; the same plant in intermediate loam would need irrigating only once every 8 to 15 days; in fine-grained clay, every 15 to 30 days.

Insufficient watering will usually dull the normally shiny green coloring in the leaves. The roots cannot take up adequate amounts of nourishment unless soil moisture is above the permanent wilting point.

Mulching

A surface mulch of well-rotted leaf mold, or of acid peat moss, will hold considerable moisture and help to cool the surface roots. It may also discourage weed growth. The addition of a 2 inch surface mulch once or twice a year is advisable.

Tilling

Camellias do not need tilling. They are shallow-rooted, and heavy tillage will harm the surface roots. Weeds may be hoed out as they appear, or pulled out, or killed with a weed spray, if the leaves are protected against spray injury.

Fertilizing

When young camellia plants, with their shallow root systems, are set out in a fer-

tile soil they need little or no fertilizer. After they are established and have used up most of the available soil nutrients, they will respond to small applications of fertilizer given every 4 to 6 weeks. This practice has proved more effective and probably more economical than large applications of fertilizer given only once or twice a year.

When to use fertilizer. Begin to apply fertilizer at the end of the rainy season, when new plant growth starts. Usually this is during March or April. At that time the plants are in greatest need of nitrogen.

Organic fertilizers, such as cottonseed meal, fish meal, blood meal, and manufactured sludge provide adequate amounts of nitrogen for young or small plants. Older or larger plants may need extra commercial fertilizer during the growing season. Dr. W. E. Lammerts, plant breeder of Descanso Gardens, La Canada, California, states that the weekly feeding of a nitrogen fertilizer at the rate of 1/4 ounce to a gallon of water has produced rapid growth on grafted plants.

Amount of fertilizer. This is best determined by watching the plant itself. In other words, if a plant is thriving, that alone is the best indication of sufficient nutrients.

Rate of Applying Some Fertilizers

Fertilizer	No. of ounces* per 100 sq. ft. of soil
Sulfate of ammonia	18
Ammonium nitrate	12
Uramon	9
Treble superphosphate	6
Superphosphate	14
17-7-0	23
16-20 ammonium phosphate-sulfate	24
Complete mixed fertilizers (acid type)	
10 per cent nitrogen	36
8 per cent nitrogen	50
6 per cent nitrogen	64

* Divide by number of applications per year for amount to apply at one time.

Deciding exact amounts of fertilizer to apply is difficult because of differences in plant size, root systems, and soil fertility. The table shown here may serve as a basis for deciding how much fertilizer of a given type should be tried. For very fertile soil or for small-sized plants, decrease the amounts shown; for less fertile soil or for larger plants, increase the amounts. To meet local needs, the fertilizers listed may be used separately or in combination.

Woody or shrubby plants, such as the camellia, should not require the addition of much more phosphate fertilizer than is already available in many California soils. If a phosphate fertilizer is needed, include treblephosphate at the rate of about $\frac{1}{4}$ ounce at each of four applications during the year.

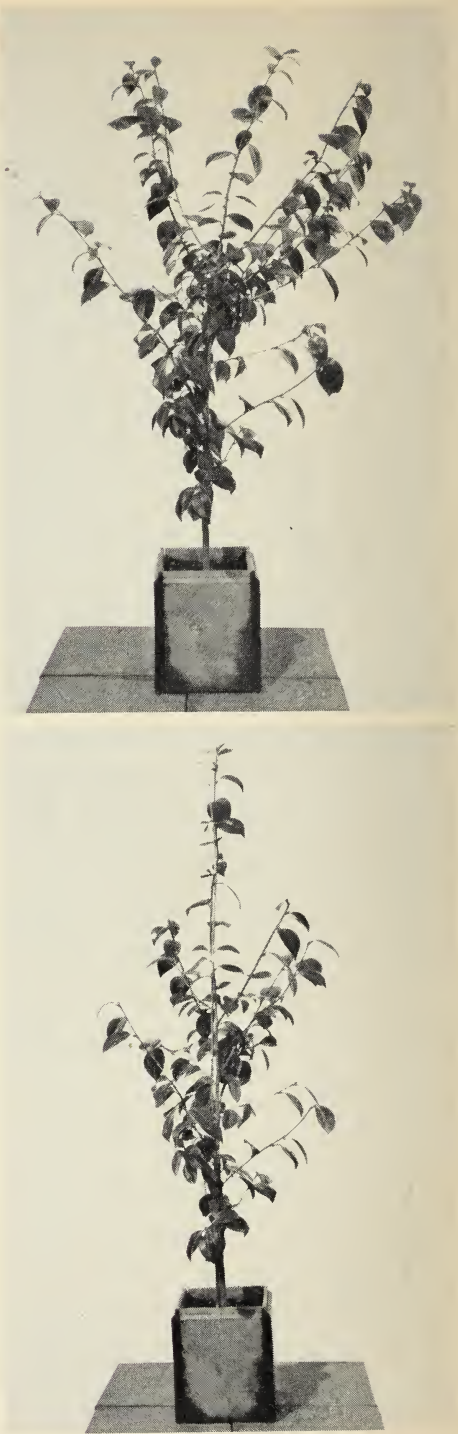
One well-known acid-type mixture contains the following:

	per cent
Acid phosphate	35
Cottonseed meal	28
Potassium sulfate	17
Ammonium sulfate	10
Aluminum sulfate (used as acidifier)	10

When making up an acid-type mixture, such as the one given here, remember that most California soils furnish an adequate amount of potash to camellias. Therefore, including potassium sulfate may be an unnecessary expense.

Fertilizing very late in the growing season may encourage late flushes of growth, and such late growth may not form flower buds. Only the early growth will be likely to develop flower buds; therefore, growers may prefer not to make late applications of fertilizer on older plants.

Nothing short of actual tests under local conditions will indicate what type of fertilizing program is needed. Even laboratory tests are of little or no value because other and more important factors,



A young plant of Romany, or Belgian Red, before and after it was pruned.

such as water, soil fertility, and temperature, closely affect plant growth.

Pruning

Camellias require very little pruning—removing unwanted branches, shortening-in of long branches to shape the plant, and some pinching-back of new growth to encourage branching.

When to prune. Pruning is done toward the end of the dormant season—about March or April.

Where to prune. All cuts are made just above a bud or a lateral. Never cut back into old wood where there are no leaves. Cutting at that point will greatly retard or even prevent further growth.

Encourage the natural growing habits of the variety. Varieties are spreading or upright, are naturally compact and bushy, or are tipped-back occasionally to remain symmetrical. Some varieties make very slow growth; others, rapid.

Chandleri Elegans, for example, is a spreading variety whose main stem is allowed to continue upright growth until it has reached the desired height. Spreading side branches may be pruned back slightly.

A vigorous variety, such as Romany, may make as many as three flushes of growth during the season, with each growth from 4 to 8 inches long. Certain branches may be removed entirely; others may be shortened-in a little. The main, upright stem may need to be supported by a stake. On most of the vigorous varieties, pruning should be completed before April 15.

When pinching-back to keep the bush compact, leave one or more buds of the new growth to continue over-all growth of the plant. Some varieties form flower buds on the first flush of growth. Prune this new growth only to shape the plant.

Disbudding

The size of blooms on some varieties is improved by disbudding. This practice does not help much, if any, in preventing

bud drop if growing conditions are not favorable (see page 14).

When a plant forms more buds than can develop satisfactorily, remove the excess buds. This is done as soon as buds have finally set, when it is possible to determine the most promising buds to leave. The larger, perfect buds should be left.

Cutting Flowers

Strictly speaking, for the best interests of the camellia plant, do not cut any of the blooms. For instance, the buds producing the new shoots that enhance the value of the plant are just behind the blooms in the leaf axils; it is difficult to remove the flowers without injuring or removing these new buds.

If flowers must be cut, remove as little as possible of the stem. This is done best by cutting the flower where it joins the stem. The blossom can then be set in a shallow cup or flat bowl, where it will keep fairly well. **Never break off the flower.**

If longer-stemmed flowers are needed for a certain arrangement, cut just above a leaf bud, or back to a healthy lateral. Remove no more leaves than are absolutely necessary.



This picture shows how near the round, blunt flower bud is to the slender, narrow leaf bud.

Occasionally a leaf is attached so close to the base of a flower that it has to be removed if the flower is cut. But this type of cutting should, where possible, be confined to those varieties developing longer

stems during the season. Cutting the long-growth varieties will damage the following year's crop of flowers less than cutting short-growth varieties. However, cut the blooms only, and not the stems.

PROPAGATE PLANTS FROM CUTTINGS, GRAFTS, OR SEEDS

Camellias are usually propagated by rooting cuttings. A few varieties, however, are difficult to root, even though they are strong growers when they once start. A very few varieties are extremely difficult to root, or do not grow well on their own roots. These include Alba Plena, Fimbriata (Alba Fimbriata), Kiyo Kanoko, Somegawa, and perhaps some of the weaker Donckelari varieties. Usually, all varieties of *Camellia reticulata* are grafted.

Camellias also may be propagated from seed, but ordinarily this is done to obtain rootstocks for grafting.

Rooting Cuttings

Use ripened green cuttings. The best cuttings come from plants grown under lath or sheltered in some other way. Their wood is not too hard. Ripened green cuttings of new growth give the

best result. The growth that starts to push out in April should be sufficiently matured by late June or early July to make the best cuttings.

Sometimes it is possible to root ripened cuttings taken during the dormant period. These usually take 6 months or longer to root, however, with success somewhat doubtful.

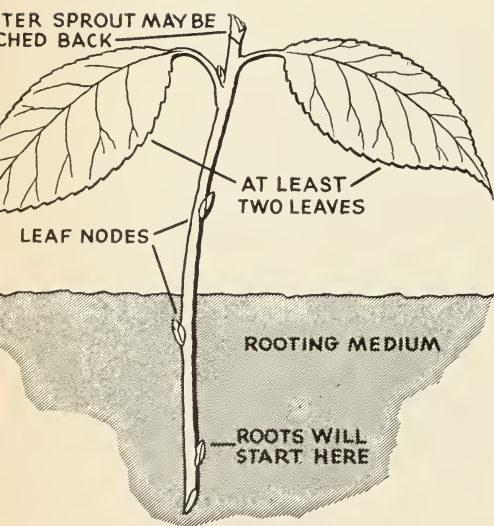
How to prepare a cutting. A cutting is 3 to 6 inches long, with at least two or three leaf nodes. Save at least two leaves near the top, as shown in the drawing.

If the cutting has started to make a second flush of growth, remove the succulent tip, but save at least two leaves near the top to assure rooting. Remove the leaves on the lower part of the cutting—the part to be inserted into the rooting medium—and, if possible, make the cut just below a leaf node.

Rooting medium. This can be any good, coarse, sharp river sand that may or may not be mixed with perlite, pumice, vermiculite, or acid peat moss. Very fine results are obtained with a mixture of 75 per cent coarse sand and 25 per cent acid peat moss.

Hormone dust. Treating cuttings with hormone dusts has not appreciably hastened rooting. It certainly does not take the place of good propagation techniques, such as controlling shade and moisture. If hormone dusts are used, follow directions on the container.

Planting the cuttings. Insert the cuttings about half way into the rooting medium. If a cutting is very short and in danger of being dislodged at irrigation, tie it securely to a short stake.



Irrigating. Water often enough to keep the rooting medium moist at all times, but not so often that the material is kept saturated.

Maintaining humidity. Protect the cuttings with a very humid atmosphere until they are rooted. Some growers root cuttings in special frames with glassed-in fronts, but the usual greenhouse bed or propagating frame, protected with cheesecloth, should be satisfactory. Use more than one thickness of cheesecloth when the summer sun is very hot. During July and August an air conditioning system may be necessary in hot interior areas.

Correct humidity can be maintained by regularly watering the cuttings. Until rooting starts, keep the glass covering closed. After rooting takes place, admit more air by leaving the cover open part way. Ultimately, under greenhouse conditions, while the cuttings are developing a good root system, the propagating frame will not need a cover. Outside a greenhouse, however, the cover of the propagating frame may be partly lifted during the hot part of the day and closed during mornings and evenings.

Rooting period. Ripened green cuttings should root in 6 to 10 weeks. Hardwood cuttings, if they root at all, may require 7 months. The two or three leaves left on each cutting should remain intact during the rooting period. Loss of these leaves usually means loss of the cutting.

Transplanting rooted cuttings. There is only one way to know when cuttings have rooted sufficiently for transplanting. Lift a few and examine the roots. If they are not yet ready for transplanting, reinsert them in the rooting medium. Protect the existing roots. Use thumb or a dibble to make a hole in the soil; insert the cutting and gently press the soil around it.

Usually, however, cuttings indicate when they are ready for transplanting without having to be pulled up. They show renewed growth and a healthy condition of the tops.

When good root systems have developed, the cuttings are transplanted into individual containers and kept in a cold frame or shaded greenhouse. As their root system increases, they are repotted at least once a year to prevent root binding. In the second or third year they may be set out in the open garden.

Grafting

What to use. Rootstocks for grafting are usually grown from seed because seedlings tend to have the most vigorous root systems. There is no reason, however, why rooted cuttings cannot be used for grafting if they display considerable vigor and a good root system.

Grafting may be done in a number of ways. Only the cleft graft (most common) and the bark graft (next most common) are recommended and described here.

Cleft grafting is used mostly from December through January and February. Choose a healthy, vigorous rootstock; cut off the top 3 to 5 inches above the ground. Slant the cut to form a bevel. Split the top of the bevel down about 1 inch.

Choose as a scion—the cutting to be grown on the rootstock—a healthy mature cutting from the past season's growth. Cut the scion 4 to 6 inches long, with the lower end wedge-shaped. Insert the scion into the high side of the split in the rootstock so that the cambium—inner layer of bark and outer layer of wood—of the two meet exactly.

Secure the junction by wrapping a cord around the rootstock. Cover the top of the entire plant to maintain considerable humidity while the graft is uniting. A bell jar is a satisfactory cover.

A large tin can with both ends cut out may also be used; one end is placed on the soil and the top is covered with a piece of flat glass. Ventilation is controlled by moving the glass on the top rim of the can.

Watch the graft to see that the surface remains healthy. The appearance of fungi on the surface near the cut usually in-



A good substitute for a bell jar is a can with both ends cut off, and the top covered with a piece of glass.

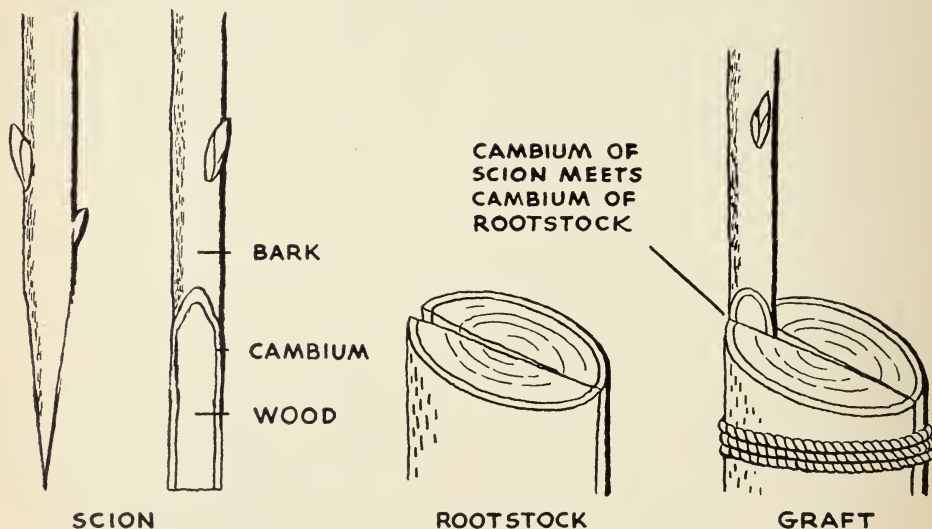
indicates a need of more air. Lift the cover during the cool part of the day. If the plant lacks air, the fungi will disappear. If they do not disappear, treat the graft

with a safe disinfectant, such as Cupro-cide or similar copper fungicidal dust.

Bark grafting should be done during the early summer, when the bark of the rootstock is more pliable. Wood from the current season's growth that has hardened sufficiently to be able to withstand severe wilting is taken for the scion. Make a cutting about 4 to 6 inches long, and leave on it at least three leaf buds. Cut the leaves in half to reduce evaporation while the scion is uniting.

Cut the lower end of the scion into a long, slim wedge, on one side for a distance of about 2 inches and on the other for a distance of about $\frac{1}{2}$ inch.

Bevel the top of the rootstock as described for a cleft graft. On the high side of the bevel, split the bark down for about an inch. Insert the wedge of the scion between the bark and the wood of the rootstock, just behind the split, keeping the wood of the scion against the wood of the rootstock and the bark of the scion against the bark of the rootstock. Force the scion down for a distance of about $1\frac{1}{2}$ inches. Tie the graft in place so that the cambium layers fit tightly together.



This shows the three steps in making a cleft graft. The slant of the rootstock should probably be greater than that shown in the drawing, for best results. Great care should be taken to insure that the cambium of the scion meets the cambium of the rootstock, or union may not take place.

The bark graft also is covered with a bell jar or a can, as used for the cleft graft, but is set under lath or in a cold frame for protection against the sun. The temperature under lath or in a cold frame must not rise above 75° F. A cheesecloth cover should give such protection in summer.

Considerable heat is needed to insure a good union of stock and scion. Therefore, grafts made in pots or tubs that can be moved about to assure adequate temperature are easier to handle than grafts made on rootstocks planted in the ground. The graft must be protected against drying or sunburn.

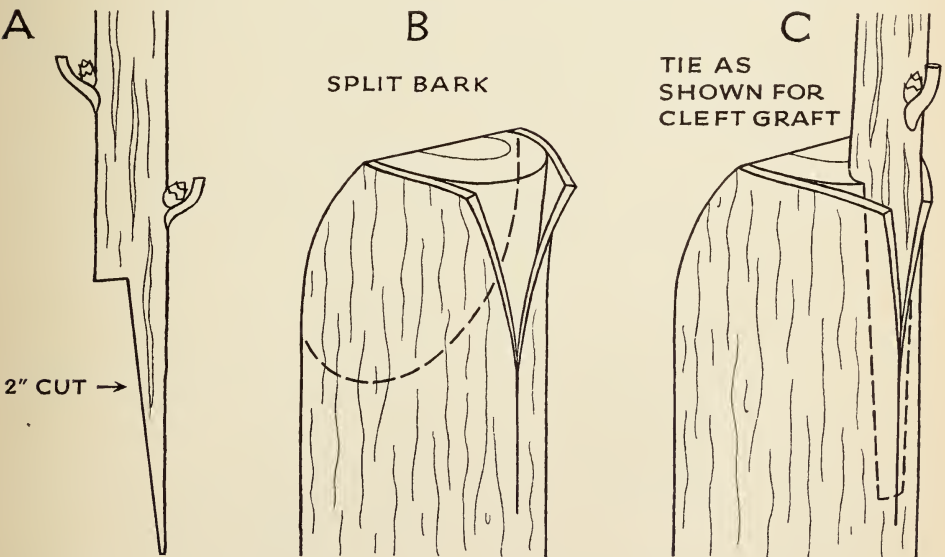
When the cut tissues of either type of graft have united, gradually remove the cover. This period usually takes 8 to 10 weeks in winter, and 4 to 5 weeks in summer. Lifting the jar, or tilting it to one side admits more air to the graft and allows the plant to harden off.

If the top of the scion shows wilting, replace the glass for a short time, so that the hardening-off process can start over again; then, follow through the same steps.



The graft union on this *Camellia reticulata* is healed over after several growing seasons.

Examine the cut surfaces to see whether callous tissue has formed against the scion. If callous tissue has formed, cover with grafting wax that part of the stock



Here are three steps used in making a bark graft. If cuts in scion are made properly, there is less chance of the cambium layers failing to unite. Drawing shows leaves removed; this is not done in actual practice. This type of graft must also be tied with cord.



A cleft that does not heal over within a year or two, as the one on the left, should be covered with grafting wax. The graft on the right was photographed after the first growing season. Healing over the cut surface is well advanced. Notice the use of the slanting cut on the stock.

and scion not yet healed. Then, remove the jar. Also remove the tie used to hold the scion in place.

A cleft graft will usually start growth shortly after the union is complete. A bark graft made in summer may remain dormant for several months, or may not produce any growth until spring.

Occasionally the cambium will not match properly, or the tissues will become infected or dried out. When this happens, the scion will fail to unite with the cambium. Instead, the rootstock may send up sucker growth. Some of the sucker growth may in time be large enough to be grafted. Weak stocks should not be grafted.

Small stocks of camellias (under $\frac{1}{4}$ inch diameter) are being used successfully for grafting. Use a calliper to check the diameter of stock and scion to be certain the two are the same size. The whip graft has been used with excellent union for such small stock grafting.

Seeding

Camellias grown from seed sometimes take five to seven years to bloom. Only growers willing to give proper attention

to them, or wanting rootstocks for grafting should attempt to grow plants from seed. Flowers from seedlings seldom are satisfactory, but occasionally a beautiful variety is discovered in this way.

Since camellia seed is not available commercially, most growers save it from single varieties to produce propagating stock. Seed produced by careful hybridizing should be used to produce worthy new varieties.

Treating seed. Some growers hasten germination by carefully cracking the hard outer shell. Others bore holes in the shell to admit water easily. With either method, avoid injuring the fleshy inner seed.

Planting. Seed is planted about $\frac{1}{2}$ inch deep, in good, rich, well-drained soil in a specially prepared seedbed, tub, or pot. Seed should be planted at the beginning of good growing weather—about March or April. Keep the soil moist during germination, which should take place in 10 to 12 weeks in favorable weather.

When seedlings are about 6 inches tall, they are transplanted to individual containers and handled in the same manner as are rooted cuttings.

CONTROL PESTS, DISEASES, BUD DROP, AND FLOWER DECLINE

Camellias are not usually subject to damage from very many pests or diseases. But no matter what the pest, DDT is never applied to camellias.

Pests

General control program. An all-round control program for pests consists of a summer oil spray during the first of April and again during the latter part of September. Use any of the safe, refined oil emulsions at a strength of about 2 per cent—2½ ounces (6 level tablespoons) to a gallon of water. Adding a teaspoon of 40 per cent nicotine sulfate, such as Black-leaf 40, may increase the efficiency of the oil spray somewhat.

Spray when the new growth is somewhat matured. This is done on days that are not too hot. Thorough coverage is important if all pests are to be reached. When a low-pressure sprayer is used, give a second application about 10 days after the first to insure more complete control.

Special control program. The summer oil spray described above should adequately control most scale insects, aphids, and spider mites. The control of certain other pests occasionally attacking camellias is discussed below.

The Fuller's rose weevil (*Pantomorus godmani*) may attack camellias growing near other types of plants it normally attacks. The wingless weevil feeds on the edges of the leaves. Cotton barriers tied around the base of the camellia trunk or branches may be enough to keep the weevils from crawling up to the leaves.

The black vine weevil (*Brachyrhinus sulcatus*) attacks a number of California plants, including camellias and rhododendrons. The adult beetle attacks the edges of the leaves, while the grubs, which live in the ground under the plant, may attack the bark just below ground surface and even girdle and kill the plant.

Benzene hexachloride (BHC) is proving to be an excellent control material. A single application of the dust to the soil under the plant may be enough to protect against emerging adults for several weeks. BHC probably will not kill all of the grubs.

This material is now available in the pure gamma isomer form (lindane) under such trade names as Isotox, or in the normal 6 per cent product. Allow 2 pounds of the 6 per cent product to 100 gallons of water, or 1 pound of 60 per cent gamma isomer to 100 gallons of water.

The omnivorous looper, or measuring worm (*Sabulodes caberata*) occasionally eats leaves and flower buds. The looper can be controlled with any good stomach poison, such as lead arsenate, used at the rate of ½ ounce to a gallon of water. Hand picking may be sufficient if only a few worms are present.

The rootknot nematode is a microscopic wormlike pest that thrives in sandy soils of good moisture and adequate heat. If it is prevalent on other plants growing near camellias it may attack the camellia roots. Plants susceptible to nematode attack therefore should not be used in the area of camellia plantings.

Diseases

Flower blight is evidenced by a discoloration of flowers. The disease is caused by a fungus, *Sclerotinia Camelliae*, that lives in the soil where diseased flowers drop. It may remain alive for several years.

Where this fungus appears, gather and destroy all diseased flowers. Leaving even a few affected blossoms may encourage the life of the fungus in the soil indefinitely.

Where flower blight appears in potted plants, remove the top 3 inches of soil and replace with new soil. This may eliminate the resting stage of the fungus. Chemical



The flower on the right was damaged by flower blight, a fungus disease. Flower blight is caused by a fungus that can live in the soil for years and resist chemical fumigants. The healthy camellia specimen at the left is shown for contrast. (Courtesy Department of Plant Pathology.)

treatment of the topsoil so far has proved ineffective for control of flower blight.

Leaf yellowing may or may not be a disease. Some cases of yellowing are thought to be caused by a virus. If this were true, yellowing would be transmitted to cuttings or grafts. There is no known cure for yellowing caused by virus. Avoid propagating with infected plants.

Leaves can also become yellowed from other causes. Yellow mottled foliage on healthy plants can be a natural variegation. The extent of variegation may differ greatly on the same plant, as on some of the mottled forms of the variety *Daikagura*.

Yellowing may also be caused by soil nutrition deficiency or by sunburn. The correction of nutritional deficiencies in the soil is explained on page 5. Sunburn can be prevented by adequate shade for the plant. It can usually be distinguished from nutritional deficiency by examining leaves that are partly shaded by other leaves. When yellowing occurs only on

exposed parts of the leaves, sunburn is usually responsible. If the entire leaf turns yellow, regardless of exposure, usually some nutritional trouble is involved.

Scar tissue (scab), which appears as small, rounded or oval raised areas, sometimes develops on the underside of leaves. At first glance these raised areas may be mistaken for scale insects; closer examination will reveal a corky layer of cells.

Since no organism of any kind has been found in these scabs, they are thought to be caused by too much wind, by injurious gases in the air, or by injurious sprays. These hazards can be avoided by choice of suitable location and use of approved sprays.

Bud Drop

Bud drop is not a disease in the true sense, but it does cause growers much concern. There is no one cause of bud drop. At present no hard and fast conclusions can be drawn about its nature. The

following factors, however, should be recognized in determining its presence:

1) The condition seems inherent in some faulty varieties, such as Pink Perfection. 2) A moist rot caused by wet weather during the time buds start to open may result in bud drop. 3) Plants that set more buds than will normally ripen seem to shed buds automatically. 4) Injury to roots or crown may induce bud drop, although when this is the cause, the plant usually shows other signs of weakness so that bud drop may be a symptom of loss of bark—caused by grub damage—that may weaken or even kill the plant. This can be determined only by

closely examining the crown. 5) Insufficient water for several weeks in late fall, before the rainy season starts, may so weaken a plant that later on buds will drop. 6) Other factors are thought to be insufficient plant food in the soil and poor drainage around the roots of the plant.

Flower Decline

Too rapid decline of open flowers usually is caused by exposure to excessive moisture, sun, or frost. This can usually be avoided by choice of location, as explained on page 2, or by removing potted plants to a more favorable location during the blooming period.

CAMELLIAS ARE CLASSIFIED ACCORDING TO FLOWER FORM

The botanical characteristics of camellia flowers form the base on which the many varieties are segregated into eight classes. This classification is based largely on work done by Dr. H. Harold Hume and Mr. R. J. Wilmot of the University of Florida.

Varieties Most Popular

Of the 10 or more distinct species of camellias, only three are considered important at the present time. These three, *Camellia japonica*, *C. sasanqua*, and *C. reticulata* are the only ones discussed in detail in this circular.

***Camellia japonica*.** The most popular varieties grown in California at present belong to the species *Camellia japonica*, a native of Japan and China. The flowers are pink, red, white, and variegated. The leaves are about 4 inches long, glossy green, ovate or elliptic, with sharp serrations. The photographs on pages 16 and 17 show the latest classification of the varieties of *C. japonica*. These plants will tolerate temperatures down to about 10°F.

Camellia sasanqua is also a native of China and Japan, but it is more straggling in growth and not so hardy as *C. japonica*. It is primarily of interest because of early flowering. It comes in two

colors—white and pink. Flowers range from single to semidouble and occasionally double. The branches are pubescent (hairy) when young and the leaf midrib also is inclined to be hairy. The leaves are glossy green and about 2 inches long. In shape they are similar to the leaves of *C. japonica*.

Camellia reticulata is a native of China. Plants are usually sparsely foliated and not so compact as many Japanese varieties. The plant commonly sold in California as *C. reticulata* (Captain Rawes type) is only one of perhaps 20 or more varieties of this species. Its rose-pink flowers average 5 to 7 inches in diameter. Its wavy petals (opposite page 1) add to its popularity. The leaves, which are about 5 inches long, are shaped like those of *C. japonica*.

Dr. W. E. Lammerts, plant breeder of Descanso Gardens, La Canada, California, reported in 1950 on "The New *Camellia Reticulata* Hybrids" in *The American Camellia Yearbook*. He listed and described 15 varieties from China. Eighteen Chinese varieties are established already in California. Complete sets of the original 15 varieties were released for sale in the spring of 1952. Among these were: 1) Peony or Peony Flowered (6 to 8 inches



CAMELLIA

1

Class: Single.

Petals: Has 5 to 7 and sometimes 9.

Stamens: All central, united into a cylinder.



2

Class: Semidouble.

Petals: Has more than 9, and usually from 14 to 20.

Stamens: All central, united into a cylinder.



3

Class: Incomplete Double with Large Petals.

Petals: Has numerous large petals.

Stamens: Single stamens, or bunches of stamens or both intermixed.



4

Class: Incomplete Double with Small Inner Petals.

Petals: Numerous small petals within the guard petals.

Stamens: Single stamens or bunches of stamens or both intermixed, forming an irregular mass.

CLASSIFICATION

5

Class: Incomplete Double with Large and Small Inner Petals.

Petals: Numerous large and small petals within the guard petals.

Stamens: Single stamens or bunches of stamens or both, forming an irregular mass.



6

Class: Double Irregular.

Petals: Irregularly arranged in a convex mass, usually small, straplike, and folded, with an outer row of normal petals.

Stamens: If present, are few in number and hidden by petals.

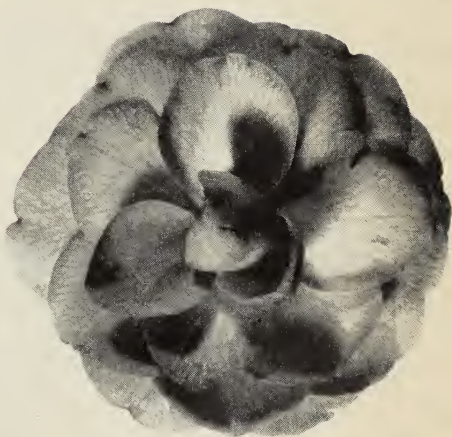


7

Class: Double, Incomplete Imbricated.

Petals: Imbricated except for relatively large, unopened center.

Stamens: None visible.

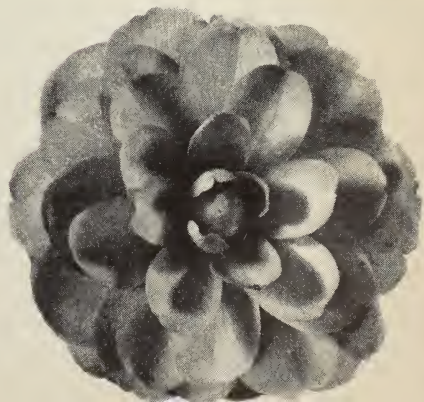


8

Class: Double, Regular Imbricated or Tiered.

Petals: Regularly imbricated (overlapping like a shingle), or tiered (laid one on top of the other).

Stamens: None.



in diameter; formal double; pink with white stripes). 2) Purple Gown (6 to 8 inches across; purple or wine red with pin stripes of white; peony form). 3) Changs Temple (6 to 8 inches in diameter; pale pink; semidouble). Others, such as Tali (rose pink lightly variegated with white), Jewelry (deep red), and Thick Leaf Butterfly Wing (rose pink), reach 6 inches or more in diameter. It will take time for these new varieties to

become available at a price that some gardeners can afford, but they are being propagated in California, and will increase the interest in *Camellia reticulata*. Hybrids of *C. japonica* are also being developed, and some of these should prove very desirable.

Other species of camellias may become popular in the future, but at present they are of interest only to collectors and plant breeders.

VARIETAL TABLES

Some Camellia Sasanqua Varieties*

Variety	Form of flowers	Color of flowers
Apple Blossom	single	pink fused on white
Blanchette	single	white
Cleopatra	semidouble	rose
Dawn	semidouble	white shaded blush pink at edges
Fuji-no-mine (Snow)	double	pure white with yellow stamens
Hiro	double	deep crimson
Hugh Evans	semidouble	deep carmine
Judith	single	phlox pink
Maiden's Blush	single	blush white
Shishigishira (sport of Showa-no-saki)	semidouble	deep pink
Showa-no-saki	semidouble	medium pink
Tanya	single	deep rose
White Doves	semidouble	white

* These are grown primarily because of their early blooming period—from early October to December. Dealers in this species are importing many other fine varieties.

Some Popular Varieties of Pink Camellias

Variety	Class*	Remarks
Ake-Bono (Dawn) M	2	fine deep rose pink; large, compact; vigorous
Bertha Harms M	2	blush pink; strong upright growth
Chandleri Elegans (Francine) M	6	rose pink; dwarf; slow growing; spreading
Chiyo-no-Hanagata (Dorothea Blanche) M	5	rose shaded white; large flower; upright; vigorous
Daikagura Shell Pink (High Hat) E-M	6	slow compact growth
Debutante (Sara C. Hastie) E-M	6	popular pale pink; light green foliage; vigorous
Eleanor Hagood L	7, 8	better than Pink Perfection; upright; vigorous
Enrico Bettoni (Sarah Frost) M	2, 3, 7	clear pink; large; not precocious; upright; variable; vigorous
Eugene Lizze M-L	5	light rose splashed white; slow; compact
Gen. George Patton M-L	3, 7	large; bright pink; upright; vigorous
Gov. Earl Warren M	3	popular; good exhibition variety
Herme Pink M	3	tall, slender plant; vigorous
Hoshiguruma (Star Wheel) E	3	deep pink, shaped like star wheel; dwarf; slow
Kumasaka (Lady Marian) M-L	3, 5	many flowers, precocious; large; vigorous; compact, upright; very popular
Lady Clare (Grandiflora Rosea) M	2	deep pink, veined deep rose, petals crinkled; popular
Lady Hume's Blush M	8	white blushed pink; loose, spreading; slow
Louise MacLay (Grandiflora Superba) M-L	2	deep pink veined deep rose, petals crinkled; spreading; slow
Magnoliaeflora Southern (Rose of Dawn) M	2	blush pink, good; compact, upright; slow; popular
Marchioness of Exeter E-M	6	light pink, large; spreading willowy branches; vigorous; very pleasing
Margaret Higdon M	3	deep rose, large, petals margined white; floriferous; upright; vigorous
Martha Price M	7	soft pink; vigorous, spreading growth
Mary Charlotte M	6	pleasing light pink; compact, upright; vigorous
Mathotiana Rosea (Pink Beauty) L	3, 7	clear pink; best in coastal area
Mme. Hahn M	3	bright pink; vigorous upright growth
Mrs. Howard Asper M	2	good large light pink, cup shaped like Lotus
Mrs. John Laing M-L	8	floriferous but rather small flowers; bushy, compact; vigorous
Mrs. Josephine M. Hearn M	3	rose pink, large fluted petals with high center; compact; upright
Mrs. K. Sawada (John Marshall) M	8	fine pale pink; patented variety; vigorous; compact, upright
Mrs. Tingley M-L	8	salmon-silver pink; compact growth
Otome Pink M-L	8	one rose pink, one light pink; good bloomer; spreading, compact; slow
Pearl Maxwell M-L	8	shell pink; vigorous, compact growth
Pink Ball M	6	pale pink, heavy flower; leaves light green; upright, compact; vigorous
Pinkie M	8	good shell pink
Pink Perfection E-M	8	precocious; drops buds badly, needs disbudding

* See pages 16-17.

E, early; M, midseason; L, late.

Some Popular Varieties of Pink Camellias—Continued

Variety	Class*	Remarks
Pink Star M-L	5	distinctive shape; petals shatter; dwarf, spreading; slow growing
Rosea Superba L	7, 8	deep rose pink, large; upright; vigorous; compact
Rose Dawn M-L	3, 7	shape like Alba Plena; upright; good grower
Shin Akebone E-M	2	flesh pink, good yellow stamens; vigorous
Silvery Pink M	8	good light rose, shaped like Pope Pius IX; compact, upright
Thelma Dale M	3	phlox pink
Valtevedra L	8	pink shading deeper pink on outer petals, cup shaped; well branched, compact, upright

Some Popular Varieties of Red Camellias

Adolphe Audusson M	2, 3	large red bloom of heavy substance; plant very sturdy
Amabilis Red M	1	good single; drops petals early
Anne Lindbergh M-L	5	rose red with high center; upright; vigorous
Arabella M	3	orange red; large; vigorous, upright
Arajishi E	6	upright; vigorous; tolerates full sun
Benten M	1	better than Amabilis; cup shaped; good substance
Blood of China (Victor Emmanuel) L	3	deep salmon red; large; compact; vigorous
Brilliant M	7	floriferous; upright; strong grower
Capitol City M-L	1	rose red; remains to be proven
Chandleri Rubra E	6	loose grower, spreading; almost same as Vedrine
Cheerful (Lucida) M	7	upright, compact; vigorous
C. M. Hovey (Colonel Firey) L	8	large dark red; spreading; slow growing; flowers shatter in hot weather
Covina M	3	rose red; compact; floriferous; easy to grow
Daikagura Red E-M	6	bushy; dependable bloomer; very popular
Edwin H. Folk M-L	3	bright red; large, loose flower; vigorous, upright growth
Elena Nobile (Napa Red) L	3	flame red; bushy, upright; vigorous; long season
Ella Drayton M-L	8	dark red; upright; vigorous; popular cut flower
Emperor of Russia M	5	large scarlet; multicentered; upright; compact
Flame M	2	deep flame red; large; floriferous; vigorous; upright; compact
Fred Sander (Fimbriata Superba) M	2	like a ruffled petunia in red; fimbriated petals; upright, compact; vigorous
Glen 40 L	8	fine deep red; precocious; upright, compact; slow growing
Goshoguruma L	2	brilliant red with heavy stamens or petaloids; very compact
H. A. Downing (Helen of Troy) M	2	bell-shaped flower; rose red veined blood red; bushy; vigorous

* See pages 16-17.
E, early; M, midseason; L, late.

Some Popular Varieties of Red Camellias—Continued

Variety	Class*	Remarks
Imperator M	6	light red of good form; bushy; vigorous
John Illges M	1	bright red, trumpet shaped, good form, very large; medium loose, upright
Lady Mary Cromartie M-L	3	large flower; upright; vigorous; slow
Lady Vansittart M	2	large flower; floriferous; good substance; very compact; holly-like foliage
Letitia Schrader M	6	dark red; large, medallion shaped; upright growth
Maraschino M	3, 7	edge of petals curves upward; blooms all at once
Mathotiana (Julia Drayton) M	3, 7	large scarlet; rose-bud center; upright, compact; vigorous; very popular
Monjisu Red L	3	cherry red, floriferous; bushy; slow grower
Mrs. Charles Cobb M	5	dark red; spreading; vigorous
Otome Red M-L	3, 7	strong bushy plant; not well known
Paulette Goddard M	3	very large red; vigorous; upright growth
Pearl Harbor L	4	dark red; large; vigorous; upright growth
Pope Pius IX M	8	large dark red that keeps well; makes long growth; upright compact
Pride of Greenville M	6	large flower; tall grower; vigorous
Professor Charles S. Sargent M	6	dark red with pompon center, not always good; floriferous; upright, compact; vigorous
Tinsie M	1	a novelty miniature
Uncle Sam M	3, 7	rose red; bushy; vigorous; needs further tests
Warratah (Anemonaeflora) M	6	not good near coast; Arajishi is better
William Downing M	2	purple red, floriferous; bushy; vigorous

Some Popular Varieties of White Camellias

Abundance M	7	large petals, flowers last well; floriferous; tall; vigorous
Alba Plena E-M	8	large flowers; bushy growth; slow; weak grower
Alba Superba E-M	3	large flowers, yellow stamens; glossy foliage
Amabilis M	1	good single, like miniature Matilija poppy; upright; vigorous
Candidissima L	8	resembles a star; shy bloomer at times but popular for more than 100 years
Caprice M	5	some yellow in the white; upright; vigorous
Chastity E-M	5	white with cream center; vigorous; compact, upright
Daikagura White E-M	6	good variety but just becoming available
Fimbriata (Alba Fimbriata) E	8	large, fringed petals; slow, bushy, spreading; popular over 100 years
Finlandia E-M	2	large, fluted; compact, spreading; slow
Florence Stratton M	8	vigorous, bushy

* See pages 16–17.
E, early; M, midseason; L, late.

Some Popular Varieties of White Camellias—Continued

Variety	Class*	Remarks
Gigantea Alba M	1	very large flowers; upright; vigorous
Joshua Youtz E	3, 6, 7	white form of Daikagura
K. Sawada M	7	large white; new and being tested
Lotus (Grandiflora Alba) M	2	very large flowers; upright; vigorous
Magnoliaeflora Alba M	2	white with cream center like water lily; large flowers; bushy
Mathotiana Alba M-L	3, 7	large flowers; petals roll back; upright; vigorous
Morning Glow E-M	8	large white; upright; vigorous
Mrs. Charles Simons M-L	5	medium compact; spreading
Nobilissima E-M	5	white shading to yellow; upright; vigorous
Otome White (White Bleichroeder) M	3, 7	medium flower; slow; compact
Pax L	8	white laurel-leaf; good bud center
Pride of Descanso M	2, 5	new; large with regular petals; upright
Purity (Shiragiku) M-L	3, 7, 8	slight yellow shading at center; floriferous; good cut flower; upright; vigorous
Supresse Nobilissima M	6	large, good, irregular; upright; fast grower
White Empress E-M	2	very large; compact, upright; vigorous
White Herme M	3	upright; vigorous
White Perfection L	8	compact; vigorous

Some Popular Varieties of Variegated Camellias

Adolphe Audusson Variegated M	2, 3	large bloom of heavy substance, dark red spotted white; compact, sturdy
Ake-Bono Variegated M	2	white lined rose pink; compact, strong grower
Amabilis Variegated M	1	pale pink striped deeper pink; upright
Anita M	2	light pink striped carmine; upright, vigorous; compact; a striking flower
Bella Romana E-M	6	light pink striped and splashed carmine; floriferous; very dense growth; shatters
Capt. John Sutter M-L	8	rose pink blotched white; upright; vigorous
Chandleri Elegans Variegated M	6	rose pink and white; one of the best; slow; spreading
Charlotte Bradford M	3	pink with white margins
Cho-no-hanagata M	3	blush pink, shaded white
C. M. Wilson M	6	sport of Chandleri Elegans, with same form and habit; light pink with delicate edge of white around petals
Countess of Orkney M-L	7	white base peppered and striped red; a good flower, better than Peppermint; compact
Daikagura Variegated E-M	6	rose pink splotched white; flowers over a long season; slow; compact
Delectissima E-M	1	white with wide pink stripe; large; spreading
Donckelari E-M	2	red marbled white; large bloom; slow grower; an old favorite
Emperor of Russia Variegated M	5	variegated scarlet, large; slow; upright

* See pages 16-17.
E, early; M, midseason; L, late.

Some Popular Varieties of Variegated Camellias—Continued

Variety	Class*	Remarks
Emperor Wilhelm E	6	angular growth, large leaves, large blooms; hard to propagate
Finlandia Variegated M	2	white streaked crimson; needs pruning
Flame Variegated M	2	deep flame red spotted white; upright, compact
H. A. Downing Variegated M	2	rose red marbled white; large; vigorous; bushy
Herme (Hikari Gengi) M	3	pink petals with white border and streaked deep pink; one of the best and dependable
Iwani Shibori M (F.G. no. 2)	2	rose red mottled white; slow, compact growth
Kasuga Shibori M	8	red blotched white; not common; spreading
Kenny L	3	deep rose pink blotched white; slow, compact growth
Kumasaka Variegated L	3, 5	rose blotched white; vigorous; upright
Lady Clare Variegated (Oniji) M	2	deep pink marbled white; bushy; vigorous
Lady Kay M	6	cherry red, variegated white
Lallarook (Laurel Leaf) M-L	8	pink marbled white, large; compact, upright; slow
Lawrewee Walker M	5	red, variegated white
Magnolia Queen L	2	white with occasional pink stripes; medium bush growth
Mallot Variegated (Princess Nagaskie) M	2	soft pink marbled white and rose, large; low, spreading; vigorous
Matsukasa (Pine Cone) L	5	cone shaped; rose pink marbled white; free flowering; bushy; slow
Mikenjaku M	2, 4	red with white blotches; spreading
Monjisu Variegated M-L	3	red marbled white; floriferous, showy; low and bushy
Mrs. Baldwin Wood M	3	white with pink stripes and blotches; medium spreading growth
Mrs. Freeman Weiss M	6	medium pink shading to white; large
Nagasaki M	2	rose pink marbled white, very large; spreading; interesting color and form; slow
Otome Variegated (Baronne de Bleichroeder) M	3, 7	soft pink streaked crimson; form similar to Pink Perfection; compact; slow
Paeoniaeflora M	6	white to cream with a few rose-red lines; large, shaggy; bushy; very old variety
Pierette M	8	flesh pink striped cherry red; large; not common; bushy; slow
Pink Lady M	6	sport of Paeoniaeflora; pink with white edge
Prof. Charles S. Sargent Variegated M	6	dark red mottled white; semidwarf; floriferous
Sensation M	2	new white to cream with rose stripes; large; compact, upright; vigorous
Sierra Spring M	3	luminous pink with white variegation
Sweeti Vera M	6	white and pale pink, large; open, upright; vigorous
Tricolor Sieboldi M	2	white streaked carmine; large, slightly cupped; upright; vigorous; old variety for mass effect
Wakanoura Variegated E-M	2	similar to above; long season; bright green leaves

* See pages 16–17.

E, early; M, midseason; L, late.

CAMELLIA ORGANIZATIONS SERVE GROWERS

Camellia fanciers have formed a number of organizations that serve many practical purposes: 1) standardize varietal names; 2) work out growing problems; and 3) furnish cultural information to anyone interested, from the professional grower to the newest amateur. Among these organizations are the American Camellia Society—a national organization—and, in California, the following societies:

Camellia Society of Kern County,
Bakersfield
Camellia Society of Orange County,
Santa Ana
Camellia Society of Sacramento,
Sacramento
Camellia Society of Santa Clara
County, San Jose
Central California Camellia Society,
Fresno
Los Angeles Camellia Society,
Los Angeles

Northern California Camellia Society,
Berkeley
Pacific Camellia Society,
Glendale
Pomona Valley Camellia Society,
Claremont
San Diego Camellia Society,
San Diego
Southern California Camellia Society,
Pasadena
Temple City Camellia Society,
Temple City

A new organization to be known as All America Camellia Selections has been formed. It is hoped that entries for the first three-year camellia competition may be sent in the fall of 1952 to test sites in Alabama, Louisiana, Georgia, South Carolina, Oregon, Washington, and central and southern California. Further information may be obtained from Mr. David Cook, Secretary, All America Camellia Selections, 11239 Ventura Boulevard, North Hollywood, California.

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Periodicals and Bulletins

- American Camellia Society Annual
Northern California Camellia Society Official Bulletin (Mrs. Barlow Hollingshead, editor, 12 La Cintilla Avenue, Orinda, California)

In order that the information in our publications may be more intelligible, it is sometimes necessary to use trade names of products and equipment rather than complicated descriptive or chemical identifications. In so doing, it is unavoidable in some cases that similar products which are on the market under other trade names may not be cited. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.

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CAMELLIAS...

require somewhat more attention than do most garden
ornamentals. Success in growing them is not always
certain, but a delightful reward for their care is the
delicate beauty of their blooms.

THIS MANUAL...

gives rather complete directions for the planting and
growing of camellias. Included are lists of the more
popular varieties, together with comments on their
growth and habits.

Selling price	\$2.428
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